- A number of Declared Monuments have been identified in the vicinity of this alignment. These include the Former Marine Police Headquarters and the Former Kowloon-Canton Railway Clock Tower. The Antiques and Monuments Ordinance (Cap.53) provides statutory protection against the threat of development against these historic sites. Whilst no direct impacts are envisaged to these resources, it is recommended that the potential impacts are further evaluated during the design and EIA processes, and that, if necessary, appropriate alignment alterations and/or mitigation measures are incorporated into the design.

7.4 Environmental Review of the Stand Alone Schemes

7.4.1 In addition to the work undertaken to assess the key environmental impacts associated with the Component Schemes, a similar exercise was undertaken for the Stand Alone Schemes. The implementation of these schemes is not related to the completion of the FHC, hence each scheme could potentially be implemented at any time; hence the terminology 'Stand Alone'. In general, the development of the Stand Alone Schemes can be considered to be at a less advanced stage than the Component Schemes, with some of the schemes (e.g. the Regional Express Line) being at a very early stage in their development. Consequently, the information presented herein must be considered as representing indicative alignments and preliminary construction methodologies; the indicative alignments are therefore subject to change as the design development process progresses.

7.4.2 This section presents the findings of this assessment for each of the Stand Alone Schemes.

Northern Links

Description and Assumed Construction Methodology

7.4.3 The NOL alignment is proposed to connect Kam Sheung Road (KSR), Au Tau (AUT), Kwu Tung (KTU) and Lo Wu (LOW), although there is also a proposal to provide a connection with the Lok Ma Chau Spur Line.

7.4.4 North of AUT, the preliminary alignment is proposed to pass through, and include a station at, Ngau Tam Mei (NTM), and then on to a station at the San Tin SGA. From here, the alignment would curve east to converge with the Lok Ma Chau Spur Line alignment (towards KTU). It is also proposed that there would be a connection to the Lok Ma Chau Spur Line (towards LMC).

7.4.5 The preliminary design information indicates that the NOL will be constructed mainly above ground on embankment and viaduct, although there will also be sections in cutting and possibly a short length of cut and cover and rock bore tunnel between NTM and KTU.

7.4.6 As the route currently under consideration comprises an at-grade scheme, there is a higher potential for environmental impacts than would exist for an underground (especially bored tunnel option).

7.4.7 The key strategic impacts are discussed below, however, it is recommended that, careful consideration is given to the highlighted areas during any future design developments in order to successfully mitigate the predicted impacts.

7.4.8 Although not actually part of the NOL scheme, there is a proposal to provide a freight link connecting the NOL with Lo Wu (LOW). For completeness, the environmental implications of this proposal have also been considered and are presented below.

Key Potential Environmental Impacts

- Due to the above ground nature of the majority of this proposed alignment, and the fact that it will pass in close proximity to a number of existing and planned sensitive receivers (e.g. Au Tau SGA, Ngau Tam Mei SGA, San Tin SGA and Kwu Tung North SGA), the construction of the NOL is likely to present the potential for noise, dust, ecological and landscape and visual impacts. The magnitude of these impacts will depend upon the final choice of construction methodology. As the scheme is at an early stage of development, the details of the construction methodology have not been finalised and therefore the magnitude of the impacts cannot be quantified. However, it is envisaged that with the incorporation of environmental considerations into the development of the construction methodology, there should be no insurmountable impacts. Nevertheless, these matters will require detailed evaluated during the EIA stage, and most likely, the specification of an appropriate package of mitigation measures.
- Water quality issues will be a key concern as the alignment passes through the Deep Bay Water Control Zone, and close to a number of fish/duck ponds, wetland areas, agricultural lands and major rivers (including the Kam Tin River, River Indus and River Beas). The Kam Tin River, River Indus and River Beas drain into the Inner deep Bay which has a zero discharge policy. Water discharges will need to be carefully controlled to ensure that they comply with the zero discharge policy. However, with the implementation of suitable mitigation, it is envisaged that the water quality objectives can be achieved, and no insurmountable water quality impacts are anticipated from the construction or operational phases.
- The currently assumed alignment has the potential to give rise to conflicts with historic/cultural resources including Deemed and Declared Monuments and Historic Buildings and Structures. A number of Declared Monuments have been identified in the vicinity of the alignment. These include the Yi Tai Study Hall, Man Lun-Fung Ancestral Hall and the Tai Fu Tai Mansion. In addition, a number of Deemed Monuments and Graded Historic Buildings and Structures have also been identified along the alignment by AMO. The Deemed Monuments include, Tang Kwong U Ancestral Hall, Cheung Chun Yuen and Hau Kui Shek Ancestral Hall and the Grade II listed Buildings include, the Hung Shing Temple and Pai Fung Temple, Siu Wai Nunnery and the Grade III Lady Ho Tong (Dispensary) Manor House, Bok Man School and Hakka Wai. Whilst no direct impacts are envisaged to these resources, it is recommended that the potential impacts are further evaluated during the design and EIA processes, and that, if necessary, appropriate alignment alterations and/or mitigation measures are incorporated into the design.

- There are no known areas of archaeological potential along the alignment, however, there are several areas of archaeological potential that may require archaeological field evaluations before the future development of the alignment. This matter will need to be thoroughly investigated during any future EIA assessment, and if resources of archaeological potential are found to be present, then appropriate mitigation measures will need to be incorporated into the design development process (e.g. avoiding the area of interest, or undertaking a rescue excavation). With the proper incorporation of archaeological issues into the design development process, no insurmountable impacts are anticipated.

- 1,680 m of the currently assumed above ground alignment enters the 1,000 m Consultation Zone of the Sheung Shui Water Treatment works. As such, a Hazard Assessment will be required. The outcome of the hazard assessment will be dependant upon many factors, however, since the currently proposed alignment will be to the west of the existing East Rail (ie further away from the PHI than current East Rail alignment), it is considered that the potential hazard implications would be lower than those which currently exist for the operation of East Rail. Consequently, at a strategic level, the proximity of the preliminary alignment to the PHI is not considered likely to constitute a factor that would prevent the further development of this alignment. However, a hazard assessment will be required to accurately evaluate the potential hazard implications, and if necessary develop appropriate mitigation (for example, the development of an 'early warning system' to prevent trains from approaching the PHI in the event of an incident at the PHI).

- The preliminary alignment would pass within the Consultation Zones of the Au Tau Water Treatment Works (PHI). The Consultation Zone of this PHI is 1,000 m. With the currently assumed alignment, 1,220 m of above ground alignment and one above ground station (KSR) would be within the Consultation Zone. A hazard assessment will be required to accurately evaluate the potential hazard implications from both the construction and operation of the railway. If necessary, appropriate mitigation measures may need to be developed and implemented. With the adoption of such mitigation measures, no insurmountable impacts are anticipated.

- Operational noise impacts are anticipated to be an issue, due both to the close proximity of a number of planned and existing sensitive receivers (e.g. Au Tau SGA, Ngau Tam Mei SGA, San Tin SGA and Kwu Tung North SGA), and because, in addition to the ordinary passenger trains, freight and PRC passenger trains are envisaged to operate along the alignment. It is envisaged that an appropriate package of mitigation measures will need to be developed (in combination with the design engineers) in order to control such impacts to acceptable levels. These mitigation measures may include the incorporation of extensive lengths of noise barriers and/or enclosures, floating track slab and/or a multi-plenum system. With the incorporation of an appropriate package of measures, operational noise issues should not result in any insurmountable impacts.

7.4.9 As stated previously, the NOL is the only predominantly above ground scheme, (comprising approximately 6.9 km of above ground track), and it therefore has the greatest potential to result in impacts, particularly to landscape and visual and ecological resources. Further discussion of this important topic areas is provided below.

Landscape and Visual Impacts

7.4.10 As the alignment passes through a predominantly flat, rural area it is likely to have a negative effect on the local landscape character and resources causing the loss of areas of arable agricultural land, fishponds, marginal mature vegetation as well as slightly reducing the scenic quality of certain areas.

7.4.11 A brief review of the characteristics of the landscape through which the route of the NOL passes is given below:

- Kam Tin to Mo Fan Heung - the currently assumed alignment is likely to pass through a semi-rural area comprising low-lying farmland, fish ponds and village developments, with several extensive areas of open storage and informal workshops and factories. The landscape character of this area can be considered suburban, small in scale and intimate, but of relatively low scenic value.
- Mo Fan Heung to Ki Lun Tsuen - the currently assumed alignment is likely to pass through an area comprising small agricultural plots, occasional ponds, wooded hillsides surrounded by sprawling villages of medium-high scenic value which are bordered by the Lam Tsuen Country Park. The railway would be highly visible from the surrounding rural countryside, villages and Country Park and could therefore have an adverse visual impact.
- North of Ki Lun Tsuen - within this section, the alignment is currently assumed to divide into two separate tracks, one line heading towards Lok Ma Chau, and the other towards Lo Wu and Sheung Shui. The area surrounding Lok Ma Chau comprises low-lying agricultural land, fishponds and scattered dwellings with much of the land comprising former fishponds which are now used for open storage. The area is considered to be of medium scenic value. The alignment would be highly visible from the existing road corridor and from the marginal agricultural land and woodland on either side.
- Chau Tau to Sheung Shui - the currently assumed alignment is likely to pass through village settlements, farmland and small industrial developments. In general, the area would be considered as being of generally low-medium scenic value. Further east, the landscape character changes from open flat flood plains and agricultural land to a wide valley which is bound by the wooded slopes of Tai Shek Mo (Crest Hill) to the west and Sandy Ridge. The alignment would be highly visible from the valley floor and from the surrounding hillsides and could therefore have a significant adverse visual impact.

7.4.12 As much of the existing landscape character from Kam Tin to Lok Ma Chau comprises of flat, scenic rural valley floors, there will be a high potential for visual impacts. During the construction phase such impacts will be relatively short lived and therefore are unlikely to constitute an insurmountable impact, especially as some mitigation options exist (e.g. controlling lighting, using decorate hoardings etc). Mitigation measures are also available to mitigate the operational phase impacts (e.g. careful design, planting etc). However, even with such measures, operational phase impacts are likely as the middle and long distance views will prove challenging to screen. A complete assessment of the landscape and visual impacts will be required during any subsequent EIA, and it is strongly recommended that landscape and visual issues are given full and proper consideration during the design development phase in order to reduce the impacts. Assuming that environmental issues are thoroughly incorporated into the design development process, (possibly by placing some sections of the alignment underground), landscape and visual impacts should not present an insurmountable impact.

Ecological Impacts of the NOL Scheme

7.4.13 The above ground nature of the NOL means that there is the potential for ecological impacts. The Mai Po Ramsar site is, at its closest, 2.5 km north-west of the currently assumed route. Whilst there are no direct impacts predicted to this important site, the proposed link (that diverges north-westwards from the NOL towards LMC) includes 0.3 km of alignment within the Wetland Conservation Area and 0.75 km inside the Wetland Buffer Areas.

7.4.14 With the assumption (following advise from the Engineering Team) that the landtake requirements along the alignment to enable construction will comprise a corridor 40 m wide, whilst for the stations, the width of the landtake will be 100 m, an assessment has been undertaken to predict the potential area of ecological habitats that may be affected by the currently assumed route. It should be noted that the alignment is still considered to be indicative, and thus it may be subject to change as the development process is undertaken, similarly, the width of the assumed 'construction corridor' may alter as the construction methodology is developed, therefore, the "strategic" assessment should be considered only as providing an indication of the potential ecological impacts.

7.4.15 The assessment predicted that the following areas of ecological habitats may be affected by the currently assumed alignment:

- 4.2 ha of natural woodland (0.04% of total natural woodland area in Hong Kong),
- 1.1 ha of other wetland, (including marsh areas), (0.32% of total other wetland area in Hong Kong),
- 8 ha of inland water (including fishponds), (0.16% of total inland water area in Hong Kong),
- 0.7 ha of low shrub (0.01% of total low shrub area in Hong Kong),
- 0.3 ha of low shrub with grass (0.002% of total low shrub with grass area in Hong Kong),
- 2 ha of grassland (0.01% of total grassland area in Hong Kong),

- 5.5 ha of cultivation (0.39% of total cultivation area in Hong Kong),
- 9.4 ha of abandoned cultivation (0.30% of total abandoned cultivation area in Hong Kong).

7.4.16 The most important ecological impacts that are predicted to result from the currently assumed NOL alignment are:

- Direct loss and fragmentation of the remaining Sha Po marsh. The Sha Po marsh is considered to have high habitat quality due to its relatively large size and high species diversity. It is known to harbour 4 regionally rare bird species, and has one confirmed and 6 probable breeding species;
- Impacts to fish ponds, particularly within the Wetland Conservation Areas and Wetland Buffer Areas, in the San Tin area. The San Tin fishponds, near Mai Po Marshes, support a relatively high species diversity of birds, harbouring 5 bird species listed as vulnerable or near threatened; and
- Direct loss and fragmentation of natural woodlands, including those at Wai Tsai, San Tin and San Wai Tsuen.

7.4.17 The currently assumed alignment for the NOL will significantly encroach into natural woodland and other wetland areas (including marsh areas and fishponds). The ecological impact from the assumed alignment would be considered moderate to high. As a consequence, careful considerations will need to be given to the future development of the alignment, and during any subsequent EIA stage, in order to avoid or minimise the impacts to important ecological habitats.

7.4.18 The currently assumed alignment would result in the loss of 1 ha of Sha Po marsh, 1.8 ha of the San Tin fishponds and 4.2 ha of natural woodland. If the finalised alignment resulted in similar impacts, these loses would need to be compensated.

7.4.19 As the NOL scheme is at an early stage of development, the actual extent of ecological impacts that will result from the finalised scheme are unknown. However, since potential impacts to habitats of high ecological value could result, a more detailed assessment will need to be undertaken as part of the EIA. In order to ensure that the overall scheme does not result in any unacceptable ecological impacts, the exact amount of compensatory areas will need to be determined, in accordance with the EIAO requirements.

Conflict with Long Valley

7.4.20 As stated previously, the freight link connecting the NOL with LOW does not actually form part of the NOL scheme, however, for completeness it has been considered within this discussion on the NOL.

7.4.21 An alignment for the freight link was put forward at stage three that conflicted with part of Long Valley, an area of ecological importance. At the time of undertaking the Stage one 'sieving' of the initial comprehensive network against absolute environmental constraints, this area had no statutory designation and therefore there was not requirement to prevent the assumed rail alignment from encroaching onto the Long Valley area.

7.4.22 Long Valley comprises a combination of marshland, ponds and active and inactive wet agricultural land. The proposed alignment would have given rise to direct impacts to this important ecological habitat, and also potentially caused indirect and/or cumulative impacts to other important ecological resources (e.g. protected or rare/endangered fauna, such as amphibians and reptiles).

7.4.23 Due to the wildlife (avifauna) that this area is supports, it is considered to be ecologically important. In view of its importance, the development associated with the Kwu Tung North SGA site was focused to the west, away from the Long Valley area.

7.4.24 The Long Valley area is unique in Hong Kong due to its large size, low levels of disturbance and proximity to Deep Bay. More than 200 species of birds have been recorded in the Long Valley area, (about half the number of all bird species recorded in Hong Kong since records started in 1958). The bird community using this area has been found to comprise primarily wetland dependant species, including four Globally threatened species, and six Regionally Important Species. In addition, the Greater Painted-snipe, which has a restricted range, being confined to two sites in Hong Kong, has been recorded to have breed in Long Valley. Overall, a recent ecological study for the NENT Development Study has concluded that the Long Valley area is one of the most important freshwater wetlands in the SAR in terms of avian diversity, and that the preservation of this area is important for protecting the biodiversity of Hong Kong.

7.4.25 In view of the above, the Town Planning Board and the Full Committee of the Advisory Council on the Environment have recommended that the Long Valley area be protected. As a consequence, the Recommended Outline Development Plan (RODP) is currently being revised to rezone the area to a classification of 'Other Specified Uses (Nature Park)'.

7.4.26 Following the completion of the re-zoning, the site will have statutory protection and will therefore, for the purposes of this strategic study, need to be considered as an absolute constraint. It has therefore be necessary to revise the freight line alignment such that it does not encroach upon the protected area. The revised alignment now runs to the north-west of the Long Valley area.

Ecological Impacts of the Freight Connection

7.4.27 Following the re-alignment, the currently proposed route for the freight connection will be approximately 0.1 km north-west of Long Valley.

7.4.28 With the assumption (following advise from the Engineering Team) that the landtake requirements along the alignment to enable construction will comprise a corridor 40 m wide, an assessment has been undertaken to predict the potential area of ecological habitats that may be affected by the currently assumed route. It should be noted that the alignment is still considered to be indicative, and thus it may be subject to change as the development process is undertaken, similarly, the width of the assumed 'construction corridor' may alter as the construction methodology is developed, therefore, the "strategic" assessment should be considered only as providing an indication of the potential ecological impacts.

7.4.29 The ecological habitats that may be affected by the currently assumed (above ground) alignment of the freight connection include:

- 5.3 ha of inland water (including fishponds), (0.1% of total inland water area in Hong Kong),
- 0.3 ha of cultivation (0.02% of total cultivation area in Hong Kong),
- 2.1 ha of abandoned cultivation (0.07% of total abandoned cultivation area in Hong Kong).

7.4.30 Given the proximity of Long Valley, the ecological impact from this alignment is considered moderate, careful considerations should be given at the EIA stage to refine the alignment to avoid the important habitats.

7.4.31 The currently assumed alignment would result in the loss of fishponds. It is therefore recommended that careful consideration be given to the development of the alignment in order to avoid or minimise the loss of fishponds. The exact area of fishponds that would be lost as a result of the finalised scheme will need to be assessed as part of the detailed EIA assessment.

7.4.32 Areas of cultivation and abandoned cultivation that are lost due to the proposed Freight Line will require compensation on a 'like for like' basis.

Summary

7.4.33 It can be seen from the above that, due predominantly to its above ground alignment, the NOL has a high potential to give rise to environmental impacts, particularly to ecological, cultural heritage and landscape and visual resources. To ensure that the potential environmental implications of the NOL (and other schemes as appropriate) are fully addressed and minimised, it is recommended that, in future, there is better integration of land use and railway planning. In particular, during the future planning and design stages, due consideration should be given to the further assessment of alignment alternatives to overcome such potential impacts.

West Hong Kong Island Line

Description and Assumed Construction Methodology

7.4.34 The West Hong Kong Island Line is proposed to extend the existing Island Line from Sheung Wan (SHW) to Kennedy Town (KEN). Two potential alignments options exist, west of Belcher Garden (BEL), for further extending the line to Green Island. The determination of the actual scheme will be dependant upon the finalised extent of the reclamation at Green Island. Both options could include potential future extensions to the Outer Western Corridor (OWC).

7.4.35 The proposed West Hong Kong Island Line will be constructed entirely underground. Preliminary design information indicates that the line will be constructed using a combination of both cut and cover and bored tunnelling techniques.

Key Potential Environmental Impacts

Section from SHW and BEL

- The preliminary design information indicates that a combination of soft and rock bored tunnels would be used between SHW and BEL. The potential impacts and further work required will be as described for other bored tunnel sections.
- A number of Declared Monuments have been identified in the vicinity of the alignment. These include the Western Market, Exterior of Hung Hing Ying Building and Exterior of Tang Chi Ngong Building. No impacts are expected to these Declared Monument as the alignment will be constructed in bored tunnel. However, it is recommended that the potential impacts are further evaluated during the design and EIA processes, and that, if necessary, appropriate alignment alterations and/or mitigation measures are incorporated into the design
- The operational impacts are expected to be negligible, with only the station entrances and the railway ventilation systems being above ground. Impacts will, therefore, be limited to possible noise, air quality and potential cooling water impacts from the ventilation system.

Section from BEL to KEN/GRI

- For both the options, the preliminary design information indicates that this section would predominantly be in rock bored tunnel, although varying lengths of cut and cover construction may be required. The potential impacts and further work associated with the bored tunnelling would be as described for other bored tunnel sections.
- The cut and cover sections have the potential to give rise to noise and dust impacts. As described previously, these will need to be considered further during any future design developments, however, with the implementation of appropriate mitigation, it is not envisaged that this should result in any insurmountable impacts.

Section from CEW to KEN/GRI via FHC

- This section is proposed to be constructed using a combination of soft and rock bored tunnels. The potential impacts and further work required will be as described for other bored tunnel sections.
- A number of Declared Monuments have been identified in the vicinity of the alignment. These include the Old Pathological Institute, the Main of St. Stephen's Girls College, the Exterior of Hung Hing Ying Building, Tang Chi Ngong Building and the Main Building of the University of Hong Kong. No impacts are expected to these Declared Monument as the alignment will be constructed in bored tunnel. However, it is recommended that the potential impacts are further evaluated during the design and EIA processes, and that, if necessary, appropriate alignment alterations and/or mitigation measures are incorporated into the design.

- The operational impacts are expected to be negligible, with only the station entrances and the railway ventilation systems being above ground. Impacts will, therefore, be limited to possible noise, air quality and potential cooling water impacts from the ventilation system.

Housing Developments

7.4.36 The construction and operation of a new railway line has the potential to give rise to impacts. The scope of the key potential strategic impacts associated with the WIL are highlighted in the preceding text. At the strategic level, it is not practicable, nor the intention, to identify all the potentially sensitive receiver locations that may be affected by the project, nor is it the intention to determine the magnitude of the potential impacts at these locations. However, it is noted that existing and proposed public housing may be located in the vicinity of the currently assumed routes and therefore, to assist with any further environmental studies that may be undertaken during the future development of the line, the locations of these public housing sites have been reviewed and details of housing sites that may be in the vicinity of the rail scheme are presented below. It is noted that the currently assumed alignments are still under development and may be subject to alteration. Therefore, the following should not be taken as a definitive list, and it should be reviewed and updated as part of any further environmental assessments. In compiling this list, reference has been made to the 1999 edition of the 'Location of Housing Authority Estates, the latest version of the Public Housing Development Programme and Control List.

Existing Public Housing Estates:

- Sai Wan Estate
- Mount Davis Cottage Area

Regional Express Line

Description and Assumed Construction Methodology

7.4.37 This development of this scheme is at a very preliminary stage. However, it is proposed that the route would link the Mass Transportation Centre (MTC) at Hung Hom with the existing boundary crossing points and the main lines in Guangdong Province. Two preliminary options have been proposed:

Option 1: East Rail Express.

7.4.38 This has two possible alternatives north of HUH with interchanges either at Shek Kip Mei (SKM) or Lok Fu (LOF). There is the potential for a track connection to the existing East Rail or a station to the south of Fanling (Fanling South - FAS). The alignment could be extended to LOW, or a longer term alternative (which is considered as a Longer Term Scheme and addressed further in Section 7.8) could result in a connection into the Guangshen Railway at Pinghu.

Option 2: West Rail Express.

7.4.39 Immediately north of HUH, this option would have the same alignment as the East Rail Express option via SKM. However, north of SKM, the alignment would diverge to the west and link into the Northern Link scheme at Kam Tin (KSR).

7.4.40 Possibly with the exception of a short section immediately north of HUH, it is envisaged that the option 1 alignment would be constructed underground till FAS. North of FAS, it is likely that both the potential options would be above ground schemes, however, at this time, there is no detailed information available concerning the proposed construction methodology.

7.4.41 For Option 2, it is envisaged that almost the entire alignment would be constructed underground, however there would be a short section at-grade where the alignment joined into the Northern Link scheme at KSR. At this time, there is no detailed information available concerning the proposed construction methodology.

Key Potential Environmental Impacts - Option 1: East Rail Express.

Section from HUH to FAS

- As the construction of this section will be in bored tunnel, no insurmountable environmental impacts are expected from the construction phase. The potential impacts and further work associated with the bored tunnelling would be as described for other bored tunnel sections.
- The construction of the stations (at either SKM or LOF) is likely to result in noise, dust and traffic impacts. Whilst the magnitude of such impacts will be related to the construction methodology adopted, it is envisaged that with the adoption of appropriate mitigation measures, such impacts should be controlled to within acceptable criteria.
- The preliminary alignment of the option via LOF would pass within the Consultation Zone of the Shatin Water Treatment Works (PHI). The Consultation Zones of this PHI is 1,000 m. With the currently assumed route, 350 m of the alignment would be within the Consultation Zone; however, the track would be underground. At a strategic level, this is considered to provide an effective form of mitigation, and the potential hazard implications are not envisaged to prevent the further development of this alignment. However, a hazard assessment will be required to accurately evaluate the potential hazard implications from both the construction and operation of the railway. If necessary, appropriate mitigation measures may need to be developed and implemented. With the adoption of such mitigation measures, no insurmountable impacts are anticipated.
- The preliminary alignment of both the LOF and SKM options would pass within the Consultation Zone of the Tai Po Tau Water Treatment Works (PHI). The Consultation Zones of this PHI is 1,000 m, and 1,300m of the currently assumed route would be within the Consultation Zone. However, the track would be underground. As stated above, this factor is considered to provide an effective form of mitigation, and the potential hazard implications are not envisaged to prevent the further development of this alignment. Nevertheless, a hazard assessment is likely to be required to accurately evaluate the

potential hazard implications. With the adoption of such mitigation measures, no insurmountable impacts are anticipated.

- As this section is proposed to be underground, no insurmountable environmental impacts are expected from the operational phase. Operational noise and vibration may be an issue if the alignment passes beneath any sensitive receivers in the urban environment, however, it is envisaged that any such potential impacts could be adequately addressed during the design and EIA stages, and as such, they would not be expected to present any insurmountable environmental impacts.
- The currently assumed alignments have the potential to give rise to conflicts with historic/cultural resources including the King Law Ka Shuk Ancestral Hall which is a declared monuments. However, the early identification of these resources will enable the alignments to be developed such that they avoid these resources as far as possible. It is not therefore envisaged that there will be an insurmountable impacts to these historic/cultural resources.

FAS to LOW

- This section of the alignment is currently envisaged as including both tunnelled and at grade sections. The above ground sections are likely to be near Fanling and the western extent of the proposed Fanling North SGA. Whilst the exact construction methodology has yet to be defined, it is envisaged that construction impacts would occur. However, with careful consideration of the chosen construction methodology together with the adoption of appropriate mitigation measures, it is considered that such impacts should be controlled to within acceptable criteria.
- Although the exact details of the above ground section have still to be developed (e.g. the definition of those sections on viaduct), there is the potential for operational noise impacts to occur at sensitive premises located near Fanling or the western extent of the proposed Fanling North SGA. Consequently, appropriate mitigation measures may be required at key locations. Such measures could include the incorporation of noise enclosure, floating track slab or the Multi-plenum System. Such design elements will need to be considered during any future design developments, and during the EIA Stage. Experience from other recent rail schemes (e.g. West rail and the Ma On Shan Line) suggests that noise can be controlled to meet the required noise criteria.
- The preliminary alignment would pass within the Consultation Zone of the Sheung Shui Water Treatment Works (PHI). The Consultation Zones of this PHI is 1,000 m. With the currently assumed route, 2,200 m of above ground alignment would be within the Consultation Zone. Whilst the alignment is currently assumed to be in close proximity to the PHI, it should be noted that the existing East Rail is also located above ground, and at a similar distance from the PHI. A hazard assessment will be required to accurately evaluate the potential hazard implications from both the construction and operation of the railway. If necessary, appropriate mitigation measures may need to be developed and implemented. With the adoption of such mitigation measures, no insurmountable impacts are anticipated.

- The currently assumed alignment has the potential to give rise to conflicts with historic/cultural resources including Declared Monuments, Historic Buildings and Structures, Archaeological sites and Heritage Trails. A number of Declared Monuments have been identified in the vicinity of the alignment. These include the Enclosing Walls and Corner Watch Towers of Kun Lung Wai, Kun Lung Gate Tower, Entrance Tower and Enclosing Walls of Lo Wai, Entrance Tower to Mat Wat Wai, Tang Chung Ling Ancestral Hall and Liu Man Shek Ancestral Hall. In addition, a number of Graded Historic Buildings and Structures have also been identified along the alignment. These include, the Grade I listed Tin Hau Temple, Grade II listed Sin Shut Study Hall, Wing Ling Wai and Tung Kok Wai historic buildings and the Grade III Shung Him Church by AMO. There are also two historic sites awaiting grading by AMO, the Two Stone Tablets of Chung Hin Bridge and San Uk Tsuen and the planned Lung Yeuk Tau Heritage Trail. Whilst no direct impacts are envisaged to these resources, it is recommended that the potential impacts are further evaluated during the design and EIA processes, and that, if necessary, appropriate alignment alterations and/or mitigation measures are incorporated into the design.
- The Shueng Shui Wah Shan Archaeological Site has also been identified within the vicinity of the alignment. This site dates back to the Neolithic period and is an important archaeological resource. Although, no direct impacts are anticipated, it is likely that there may be several other areas of archaeological potential along the route that may require archaeological field evaluations before the future development of the alignment. This matter will need to be thoroughly investigated during any future EIA assessment, and if resources of archaeological potential are found to be present, then appropriate mitigation measures will need to be incorporated into the design development process (e.g. avoiding the area of interest, or undertaking a rescue excavation). With the proper incorporation of archaeological issues into the design development process, no insurmountable impacts are anticipated.
- As the proposed railway would include above ground sections, both construction and operational phase landscape and visual impacts could occur. The magnitude and extent of these potential impacts cannot be evaluated at this stage since the exact alignment and those sections that will be either at grade or on viaduct are not yet defined. However, the proposed corridor will not directly conflict with any of the absolute environmental constraints that are considered to possibly include areas of land with high landscape value (e.g. Country Parks), although it may have a short length of above ground alignment within a green belt. Nevertheless, it is considered that a sensitive design and landscaping features can be incorporated into the development process, and therefore, in strategic landscape and visual terms, the proposed corridor should not present any insurmountable strategic impacts. However, the potential landscape and visual impacts will need to be given further consideration, and be fully evaluated during the EIA stage, in order to ensure that appropriate mitigatory measures are developed.

- As the currently assumed scheme includes above ground sections, it has the potential to give rise to ecological impacts. Assuming that, to enable construction, the landtake requirements along the above ground sections of alignment will comprise a corridor 40 m wide, whilst for stations, the width of the landtake will be 100 m, it has been predicted, at a strategic level, that the following ecological habitats may be affected. However, it should be noted that as the alignment is still subject to change and the width of the 'construction corridor' may alter as the construction methodology is developed, the figures presented are only intended to provide an indication of the potential ecological impacts.
  - 0.15 ha of natural woodland (0.002% of total natural woodland area in Hong Kong),
  - 0.62 ha of plantation woodland (0.01% of total plantation woodland area in Hong Kong),
  - 0.36 ha of other wetland (0.11% of total other wetland area in Hong Kong),
  - 3.7 ha of inland water (0.08% of total inland water area in Hong Kong),
  - 1.65 ha of low shrub (0.02% of total low shrub area in Hong Kong),
  - 0.17 ha of tall shrub (0.002% of total tall shrub area in Hong Kong),
  - 1.8 ha of grassland (0.01% of total grassland area in Hong Kong), and
  - 0.34 ha of cultivation (0.02% of total cultivation area in Hong Kong).

  Overall, the potential ecological impact from this alignment is expected to be low to moderate. However, to avoid impacting upon important habitats, such as natural woodlands, consideration should be given to minimising the potential ecological impacts during the further development/refinement of the alignment, and during the EIA stage.

Key Potential Environmental Impacts - Option 2: West Rail Express

- Whilst the WRE is predominantly underground scheme, the section will include some above ground sections, the details of which are subject to change as the scheme is further developed.
- As the main proportion of the alignment is envisaged to be constructed in bored tunnel, no insurmountable environmental impacts are expected from the construction phase. The potential impacts and further work associated with the bored tunnelling would be as described for other bored tunnel sections.
- The construction of the at-grade section, where the alignment is envisaged to join into the Northern Link scheme at KSR, and the construction of the stations (at either SKM and TWE) are likely to result in noise, dust and traffic impacts. Whilst the magnitude of such impacts will be related to the construction methodology adopted, it is envisaged that with the adoption of appropriate mitigation measures, such impacts should be controlled to within acceptable criteria.

- For the underground section, no insurmountable environmental impacts are expected from the operational phase. Operational noise and vibration may be an issue as the alignment passes beneath the urban environment, however, it is envisaged that such issues can be adequately addressed during the design stage, and they would not be considered to present any insurmountable environmental impacts.
- Operational noise impacts are likely to occur in relation to the at-grade section, where the alignment joins into the Northern Link scheme at KSR. Whilst the exact details of this above ground section have still to be developed (e.g. the definition of those sections on viaduct), it is considered that such impacts should be adequately controlled through the adoption of appropriate mitigation measures, such as the incorporation of floating track slab or the Multi-plenum System. Such design elements will need to be considered during any future design developments, and during the EIA Stage.
- In relation to the currently assumed above ground sections, it is predicted that the following ecological habitats may be affected. However, it should be noted that as the alignment is still subject to change and the width of the 'construction corridor' may alter as the construction methodology is developed, the figures presented are only intended to provide an indication of the potential ecological impacts.
  - 0.22 ha of natural woodland (0.002% of total natural woodland area in Hong Kong),
  - 1.6 ha of other wetland (including marsh areas), (0.49% of total other wetland area in Hong Kong),
  - 8 ha of inland water (including fishponds), (0.16% of total inland water area in Hong Kong),
  - 9.2 ha of cultivation (0.65% of total cultivation area in Hong Kong),
  - 2.2 ha of abandoned cultivation (0.07% of total abandoned cultivation area in Hong Kong).
- Of most ecological significance, the alignment would give rise to the loss of 1 ha of the Sha Po marsh. Given this significant encroachment into Sha Po marsh, the ecological impact from the currently assumed alignment are considered moderate to high. As a consequence, careful considerations will need to be given to the future development of the alignment, and during any subsequent EIA stage, in order to avoid or minimise the impacts to this important ecological habitat. The losses to the Sha Po marsh would need to be compensated. However, as the WRE scheme is at an early stage of development, the actual extent of ecological impacts that would result from the finalised scheme cannot be quantified at present. Therefore, further detailed assessment will need to be included in the scheme's development, and undertaken as part of the EIA, to ensure that the overall scheme does not result in any unacceptable ecological impacts. The exact amount of compensatory areas will need to be determined, in accordance with the EIAO requirements. (Consideration of the actual extent of impacts to the it Sha Po marsh may need to be considered in combination with the ecological impacts resulting from the NOL scheme).

Housing Developments

7.4.42 The construction and operation of a new railway line has the potential to give rise to impacts. The scope of the key potential strategic impacts associated with the Regional Express Line are highlighted in the preceding text. At the strategic level, it is not practicable, nor the intention, to identify all the potentially sensitive receiver locations that may be affected by the project, nor is it the intention to determine the magnitude of the potential impacts at these locations. However, it is noted that existing and proposed public housing may be located in the vicinity of the currently assumed routes and therefore, to assist with any further environmental studies that may be undertaken during the future development of the line, the locations of these public housing sites have been reviewed and details of housing sites that may be in the vicinity of the rail scheme are presented below. It is noted that the currently assumed alignments are still under development and may be subject to alteration. Therefore, the following should not be taken as a definitive list, and it should be reviewed and updated as part of any further environmental assessments. In compiling this list, reference has been made to the 1999 edition of the 'Location of Housing Authority Estates', the latest version of the Public Housing Development Programme and Control List.

- Existing Public Housing Estates:
  - Homantin South (Ph.1) Estate
  - Oi Man Estate
  - Chu Man Court
  - Kwun Fai Court
  - Sheung Lok Estate
  - Lok Fu Estate
  - Shek Kip Mei Estate
- Proposed Public Housing Estates:
  - Homantin South (Phases 3 & 4)
  - Homantin South (Phase 2)
  - Kwun Hei Court
  - Valley Road (Phases 1, 2 & 3)
  - Homantin (Phases 1 - 4)
  - Homantin Phase 6 (NCC)
  - Shek Kip Mei (Phases 1 - 7)
  - Shek Kip Mei Flatted Factory
  - Tak Keung Court (Wang Tau Hom Phase 14)
  - Lok Fu (Phases 3 & 7)

Port Rail Line

Description and Assumed Construction Methodology

7.4.43 The Port Rail Line is proposed to provide a direct rail link to the Port Rail Terminal (PRT) adjacent to Hong Kong's container port at Kwai Chung. Two route alignments have been proposed for the Port Rail Line from the border at Lo Wu to the PRT via either East Rail or West Rail.

Option 1: East Rail

7.4.44 The East Rail option would use the existing tracks from Lo Wu to Tai Wai (TAW), and then divert from the East Rail alignment with a grade separated junction at TAW, before heading westwards on viaduct and then entering rock tunnel towards Lai King. The Port Rail Line would then cross over the West Rail tunnels and curve south parallel the West Rail tunnels to Mei Foo West Rail Station. The line would run past Mei Foo Station and under the West Kowloon Expressway where it would run directly below the Airport Expressway structure to emerge at the PRT.

Option 2: West Rail

7.4.45 The West Rail option would follow the Northern Links to Kam Tin (KSR) and join the West Rail Main Line. The Port Rail Line would run down the West Rail route before diverging from the Main Line in tunnel between Kwai Fong and Mei Foo, and then on to the PRT.

7.4.46 Option 1 would comprise mainly rock bored tunnel, although there would be a short section of viaduct (approximately 400m) from TAW, and, after emerging from the bored tunnel, a cut and cover section of approximately 600m before the alignment continued at grade (for approximately 100m) to the PRT.

7.4.47 Option 2 would utilise much of the existing or planned rail infrastructure and would require only relatively minor additional construction works to complete this potential project. The connection of the Northern Links (at Kwu Tung -KTU) to LOW would require the construction of short sections of viaduct, embankment and cutting. As the West Rail option would use the planned Northern Links and West Rail infrastructure, the only other construction work would comprise a short section of rock tunnel (approximately 1,500m) after diverging from the West Rail Main Line in tunnel between Kwai Fong and Mei Foo, followed by (approximately 650m) of cut and cover tunnel and 100 m of at-grade track before the alignment terminates at the PRT.

Key Potential Environmental Impacts - Option 1: East Rail

- Noise, dust and traffic impacts would be expected from the construction of the viaduct section near TAW, and from the cut and cover and at-grade sections near the PRT. As discussed previously, the magnitude and duration of the potential impacts will be related to the actual choice of construction methodology, however, with the application of appropriate mitigation measures, it is envisaged that such impacts could be mitigated to acceptable levels.
- No insurmountable environmental impacts are expected from the construction of the bored tunnel section of the alignment. The potential impacts and further work associated with the bored tunnelling would be as described for other bored tunnel sections.

- The preliminary alignment would pass within the Consultation Zones of the Shatin Water Treatment Works and Shek Lei Pui Water Treatment Works PHI). The Consultation Zones of these PHI's are both 1,000 m. With the currently assumed alignment, 100 m and 120 m respectively would be within the Consultation Zones of the Shatin Water Treatment Works and Shek Lei Pui Water Treatment Works. Both sections of track would be underground within the Consultation Zones. At a strategic level, this is considered to provide an effective form of mitigation, and the potential hazard implications are not envisaged to prevent the further development of this alignment. However, a hazard assessment will be required to accurately evaluate the potential hazard implications from both the construction and operation of the railway. If necessary, appropriate mitigation measures may need to be developed and implemented. With the adoption of such mitigation measures, no insurmountable impacts are anticipated.
- Operationally, it is not envisaged that there would be any insurmountable environmental impacts on the section of the alignment from TAW to the PRT. However, on the existing section of East Rail, the intensification of the use of the line may result in potential operational noise implications, although, as electric locomotives are currently envisaged and the amount of intensification is not currently perceived as being significant, such potential concerns are not considered to represent a major concern. Nevertheless, this matter will require careful considered during the design development and EIA Stages, in order to verify whether any potential noise impacts will occur. If necessary, appropriate mitigation measures will need to be developed or careful consideration given to the scheduling of the services.

Key Potential Environmental Impacts - Option 2: West Rail

LOW to KTU

- Noise, dust and traffic impacts are likely to result from the construction of this above-ground section of the alignment. These impacts will need to be considered during the design development and EIA Stages, however, with the adoption of appropriate mitigation measures it is not envisaged that this will result in any insurmountable problems.
- Noise impacts are likely to occur during the operational period. Consequently, appropriate mitigation measures may be required. The requirement for such mitigation should be evaluated during any future detailed design developments, and during the EIA Stage.
- As the proposed railway would run through a predominantly rural environment, operational visual impacts are likely. These will need to be considered during the EIA Stage and appropriate mitigation measures developed.

West Rail Main Line to the PRT

- No insurmountable environmental impacts are expected from the construction of the bored tunnel section of the alignment. The potential impacts and further work associated with the bored tunnelling would be as described for other bored tunnel sections.
- Noise, dust and traffic impacts are likely to occur during the construction of the cut and cover section, however, as it is currently envisaged that the length of cut and cover will be relatively small, it is considered that such impacts could be successfully mitigated against through the adoption of appropriate mitigation measures developed during the EIA stage.

Housing Developments

7.4.48 The construction and operation of a new railway line has the potential to give rise to impacts. The scope of the key potential strategic impacts associated with the PRL are highlighted in the preceding text. At the strategic level, it is not practicable, nor the intention, to identify all the potentially sensitive receiver locations that may be affected by the project, nor is it the intention to determine the magnitude of the potential impacts at these locations. However, it is noted that existing and proposed public housing may be located in the vicinity of the currently assumed routes and therefore, to assist with any further environmental studies that may be undertaken during the future development of the line, the locations of these public housing sites have been reviewed and details of housing sites that may be in the vicinity of the rail scheme are presented below. It is noted that the currently assumed alignments are still under development and may be subject to alteration. Therefore, the following should not be taken as a definitive list, and it should be reviewed and updated as part of any further environmental assessments. In compiling this list, reference has been made to the 1999 edition of the 'Location of Housing Authority Estates', the latest version of the Public Housing Development Programme and Control List.

- Existing Public Housing Estates:
  - Lai King Estate
  - Lai Yiu Estate
  - Ching Lai Court
  - Yin Lai Court
  - Yuet Lai Court
  - Tsui Yiu Court
- Proposed Public Housing Sites
  - Lai Chi Kok (Phases 1 & 2)

The Port Rail Terminal

7.4.49 At this stage of the project's development, there are limited details available regarding the proposed Port Rail Terminal (PRT). However, it is envisaged that the PRT will be a state of the art intermodal terminal located at the Kwai Chung port area of Kowloon. The PRT is likely to be triangular in shape with the site bordered on the west by the container Port Road, on the north by Route 3, on the south by CP3 and to the east by the proposed road CP2. The envisaged site is currently occupied by the Lai Chi Kok North Container Back-up Area.

7.4.50 The following points provide a brief summary of the potential strategic environmental impacts that are likely to be related to its development.

- Noise from the operation of the PRT has the potential to give rise to impacts, especially as it is likely to require night-time working. However, as the area in which the PRT is proposed is already used for similar uses (i.e. the container terminal), and there are limited sensitive receivers in the locality, the introduction of the PRT into the area would not be envisaged to result in any insurmountable noise impacts.
- The PRT is proposed to be located on an area of reclamation. If there is a need to excavate beneath the existing sea bed during the construction phase, there is the potential to encounter contaminated marine sediments. This matter will require further consideration during the development of the PRT, however, it is predicted that such concerns can be effectively mitigated and therefore, no insurmountable problems are envisaged.

7.5 Comparison of the Air Quality Implications of Freight Movements on the Port Rail Line

7.5.1 The vast majority of freight movements with the Mainland are associated with Guangdong province, and are principally road-hauled, increasingly in containers. However, as river-trade offers some cost advantages, this has grown steadily in recent years.

7.5.2 The RDS-2 study has given specific consideration to freight as part of the freight rail study. The PRL has been proposed as one of the Stand Alone schemes.

7.5.3 Due to economic factors, it is considered that the market potential for rail lies in distant inland markets where the economies of scale of rail transport can compete with other multi-modal transhipment routings. At present these markets are not substantially developed.

7.5.4 The PRL/PRT concept aims at offering inter-modal freight transport with rail as the line haul (long distance) mode supported by feeder rail, road and river modes at key transfer centres (e.g. Wuhan). A freight distribution centre would be developed at Pinghu north of Shenzhen to receive trains from the Mainland, consolidate cargo into containers as necessary, and despatch to Hong Kong (via PRL/PRT) or the Shenzhen ports. Conversely freight will be received from Hong Kong and Shenzhen ports at Pinghu for despatch to destinations in the Mainland.